CHAPTER 2

SCOPE PROCESS AND PROJECT MANAGEMENT

INTRODUCTION

The South Dakota Department of Transportation (SDDOT) is an active member of American Association of State Highway and Transportation Officials (AASHTO) to share common national design standards for the state highway system. The AASHTO Technical Committee on Geometric Design publishes the document *A Policy on Geometric Design of Highways and Streets*. The current edition of *A Policy on Geometric Design of Highways and Streets* and other design guidance as listed below, but not limited to, shall be referenced for design standard guidance when establishing project criteria if this manual does not provide guidance in a particular design area.

- AASHTO - *LRFD Bridge Design Specifications*
- AASHTO *Roadside Design Guide*
- AASHTO - *Highway Safety Manual*
- AASHTO - *Guide for the Development of Bicycle Facilities*
- AASHTO - *A Policy on Design Standards—Interstate System*
- AASHTO - *Roadway Lighting Design Guide*
- Federal Register - *23 CFR 625 – Design Standards for Highways*
- FHWA - *Manual on Uniform Traffic Control Devices* (MUTCD)
- Transportation Research Board - *Highway Capacity Manual*

In order to economize major highway construction projects in South Dakota, a formal process to establish the proper scope for these projects should follow this chapter.

This process addresses the purpose and needs of the highway as well as identifies work centers involved in the design process, maintains consistency across the state, provides more accurate cost estimates, and utilizes the available funding in the most effective manner possible. The process should be applied to all pertinent projects to be entered into the Statewide Transportation Improvement Program (STIP).

The Approved Scope is the resulting detailed document used to describe a project's type of work, limits of work and the appropriate design standards to complete the project's construction plans as well as determining the project's schedule and cost estimate. The scope document is created through the SDDOT "Concept to Contract (C2C)" computer application.

PROJECT IDENTIFICATION/SCOPE PROCESS

The need for a project can be identified by a combination of management systems, department personnel, and public input. The "Concept" of a project should include the proposed project limits, work type, and potential impacts.

Scope Document Details

The scope document will define the purpose and need of the project while outlining the existing characteristics along with projected conditions of roadway elements. If the project is scoped after it has been added to the STIP, the author will verify the project elements.

The Scope will consist of the following:

- Executive Summary – General summary of the project
- Project Characteristics – Notes the project as identified in the STIP, identifies any additional studies or outside resources, environmental impacts, utility impacts, agreements or resolutions needed, survey needs, and construction sequencing.
- Background Information – Old plans, other projects in the STIP, traffic data, crash data, roadway characteristics, structure information, lighting/signal/intersection data, and excluded elements.
- Proposed Project Information – Includes the various types and appropriate design standards for work which may be included in a project such as: ADA, grading, hydraulic, structures, resurfacing/surfacing, roadside development, ROW, safety, and traffic
- Appendix – Location for additional information or reports
- Sign Off – Section of the scope where the scope is signed by the appropriate regions, area, or program.
- Design Exception – If a design exception is determined to be applicable for a project.

Draft Scope

During the development of the Draft Scope or project "Concept", the recommendations from appropriate managers of the following management systems must be included for analysis:

- Bridge Management
- Pavement Management
- Highway Capacity
- Highway Safety
- Culvert Management
- Roadway Lighting
- Traffic Signals
- Guardrail System
- Planning Studies (normally capacity related)
- Etc.

The purpose of the draft scope is to combine background information on the roadway segment and begin to build the purpose and need of the project. The background information for roadway and elements will be completed along with recommendations from the appropriate management systems. Once this is done, all potential options are listed with pros and cons associated with each option for each need. Typical needs and appropriate improvement types associated with South Dakota highways are listed in the Proposed Project Information tab of the C2C scoping module for each project.

The draft scope may be sent to stakeholders and/or a Project Kick-off meeting may be conducted if the project is anticipated to reconstruct the roadway or for special projects. Their review at this stage is to provide additional possible options before proceeding on to the next step.

Proposed Scope

The proposed scope identifies the purpose and need of the project as identified by the author. The proposed scope will include the background information along with proposed improvements to the roadway facility. The improvements will fit the purpose and need of the project.

The author will review and make recommendations on improvements to the route which meet all pertinent state policy, federal, and design manual requirements. If elements of the roadway facility do not meet design standards, the author should review the feasibility and reasonability of making improvements. If, through their analysis, modifications are neither feasible nor reasonable the author should draft a design exception. If the element which is being excepted is on the NHS and inclusive of the Ten Controlling Criteria, the design exception will require FHWA approval on all Interstate projects and Projects of Division Interest (PODI). The process for developing a design exception is explained under the section of this chapter labeled "Design Exceptions"

The author will determine if a public meeting in accordance with the public involvement policy is needed for the project including, but not limited to, the following:

- Impacts to adjacent properties
- Modification of lane configuration
- Environmental Impacts
- Informal Public Input which could impact the scope of work

Recommended Scope

The recommended scope is the "final draft" version of the scope document submitted for the approval of required department personnel. By this point in the scoping process, all scope review comments received from department personnel, public, FHWA and other stakeholders will be addressed.

Approved Scope

The approved scope is the final scope document issued by the department. All comments from previous versions of the scope have been addressed and its purpose is to guide the designer. If modifications are needed to the project after the scope has been approved, a scope amendment is to be completed.

Signing/Approving of Scopes

The scope will be approved by the appropriate stakeholders during the recommended scope phase. The stakeholders consist of the design offices, areas, and regions. If agreement on the scope cannot be met by any entity, the Planning & Engineering and Operations Division Directors can approve or require modifications on their behalf.

Distribution of the Scope

The scope will be sent to all programs within the Division of Planning & Engineering, the appropriate area and region offices, and to the FHWA, on projects environmentally classified as a CE2 or CE3 and all federal Projects of Division Interest (PODI), Each program, area, or region should make the scope available to appropriate personnel within their office to solicit comments.

Scope Amendment

A scope amendment is to be issued on an approved scope if, through the design process or development of new information, work has either been revised, added or removed from the project which impacts the purpose and need, cost, schedule, environment, or involved work centers. The scope amendment will be approved by all impacted design offices, area, region, and Project Development.

There are two types of Scope Amendments:

1. Formal Scope Amendments require approval from Scope Approvers and affected offices, examples include:

    a. Addition of work requiring a work center not previously involved based on the Approved Scope, such as adding Structure or RCBC replacement, Signals, Lighting, etc.
    b. Major changes to the project limits as would be the case if absorbing another segment or project
    c. Changes to the project scope which require rescheduling and change of programmed fiscal years

2. Informational Scope Amendments do not require approval but are shared with Project Stakeholders, examples include:

    a. Clarification of items already included in scope, such as if an Approved Scope referred to replacing most roadway lighting in a segment and reusing a number of light poles, but during Preliminary Design Inspection it is determined to replace all light poles.
    b. Minor changes to project limits, such as excluding a small segment or adding a surfacing exception.
    c. Quite often scope changes will be discussed in meetings involving all Project Stakeholders. In this case Informational Scope Amendments may be used for more major changes when those changes have been discussed and agreed upon in person and/or in a group/meeting format.

DESIGN STANDARDS

The design standards for each project will be dictated by the anticipated improvements. Unless stated otherwise, the standards in the Road Design Manual are for reconstruction or 4R projects. Design criteria for other improvements can be found in DOT policy PE 6.0, as identified in the appendix. If a design criterion is not specifically addressed in the Road Design Manual, reference should be made to the appropriate AASHTO Design Manual as noted in the introduction of this chapter.

The decision tree in Figure 2-1 is intended to guide the author in selecting the appropriate design standards for various improvements.

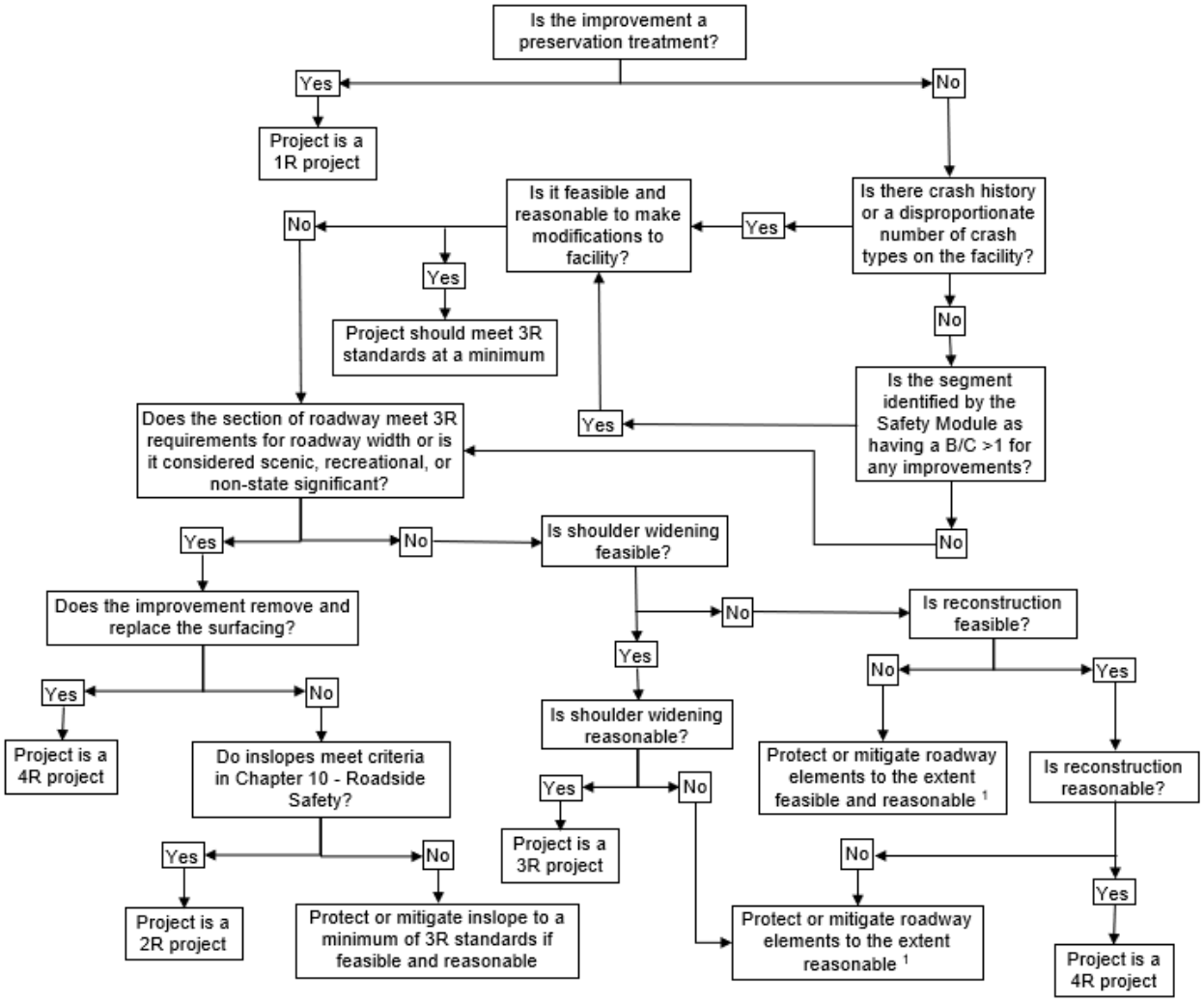
Design Speed

Design Speed is the selected speed used to determine the various geometric design features of the highway. The selected design speed should be a logical one with respect to the topography, anticipated operating speed, the adjacent land use, and the functional classification of the highway. In selection of design speed, every effort should be made to attain a desired combination of safety, mobility, and efficiency within the constraints of environmental quality, economics, aesthetics, and social or political impacts. Once the design speed is selected, all the pertinent highway features should be related to it to obtain a balanced design.

For reconstruction/construction of high-speed ($\geq$ 55 mph) rural and/or urban highways the design speed selected should generally be 5 mph greater than the posted speed (typically 85th percentile of the operating speed). However, the design speed may be set equal to the posted speed based on the following.

- Cost – If a higher design speed causes extreme excavation or results in significant impacts to adjacent property and increased right-of-way acquisition
- Environment – If a higher design speed causes significant impacts to the surrounding environment

For reconstruction/construction of intermediate (45 to 50 mph) and low speed ($\leq$ 40 mph) urban highways the design speed selected may be equal to or 5 mph greater than the posted speed. For example, in areas where it is anticipated that the posted speed will be lowered in the future based on development and increased traffic volumes, the design speed selected may be set equal to the current posted speed.



[1] Mitigation of roadway elements should meet a minimum of 3R standards

Figure 2-1 Design Standards Flow Chart

DESIGN STANDARDS FOR RESTORATION, REHABILITATION, RESURFACING AND RECONSTRUCTION OF STATE HIGHWAYS AND BRIDGES

The following information includes design standards for restoration, resurfacing, rehabilitation, and reconstruction projects on existing highways, as well as guidance on how to address the purpose and need of the project while promoting safety through effective asset management. There are 3 types of needs that lead to the development of any project:

1. Safety
2. Condition
3. Capacity

All projects, whether originating from a **Safety**, **Condition** or **Capacity** related need, should be scoped with all needs considered as early as possible in the planning/project delivery process.

The first priority in defining a project scope is to define a project's purpose and need, or why the project is happening. Consideration of a projects purpose is crucial to efficient and effective decision making for Project Delivery for both the planning and design phases.

The scope will identify needs, research and analyze background information relevant to a proposed or programmed project, identify work types to include in the project, define design standards to be achieved, and serve as single point of references for all Project Team members.

Projects will address all transportation modes. The need for repair of infrastructure condition could be based on the condition of roadways, pedestrian facilities, or bicycle facilities. While some projects will have various combinations of these types of needs, there is typically a primary reason why the project was undertaken, and that primary reason should set the overall direction for the scope and design of that project.

Through the scoping process it may be determined that improvements above or below particular design standards are necessary for that project. Justification for deviating from design standards should include a life cycle cost analysis, evaluation of design elements, documentation of existing and anticipated (predicted) crashes, and must take into consideration the long-range improvements and needs of the transportation facility.

Typically, only those projects whose design requires communication, collaboration and coordination between multiple offices or work centers have a formal scope document developed by Project Development. The scope is meant to ensure that all DOT stakeholders in the project can make sure the extent of work and design standards pertaining to their part of the project is sufficiently detailed and accurately defined.

Table 2-1 lists the types of projects that have formal scopes.

AC or PCC Resurfacing	These projects range from 1R (Class S AC Overlays) to 3R projects. May or may not include Milling, Full Depth Reclamation, PCC overlay, remove & replace PCC, Crack & Seat w/ AC overlay, Rubbilize & AC surfacing, pipe work, addition of turn lanes, ADA upgrades, lighting, signals, work on bridge rail to accommodate guardrail upgrades, etc.
Urban and Rural Reconstruction & Shoulder Widening	Scope required to define project limits, work to be included in project and design standards to be met. In cases where project includes features such as realignment (rural) or adding/removing lanes (urban) a planning public meeting may be conducted in conjunction with scope development.
Structure Replacement	Replacement of Bridges or RCBC's require development of scope to define standards to be met with project and ensure communication, coordination and collaboration between all project stakeholders/offices involved with survey, environmental, design (Bridge office for Structure plans and another design office for plans assembly), ROW and construction. Projects involving structures over Railroads require extensive communication, coordination and collaboration with Railroad and project schedule will need to reflect additional time necessary for plan review and coordination with Railroad.
Traffic Signal Upgrades/Replacement	Replacement of traffic signals, or relocation of signal poles classify as an 'Alteration Project', which requires that ADA curb ramps meet standards.
Structure Repair	Structure repair projects involving scour repair, column repair (involving work in the water), deck replacement, LSDC Overlay, approach slabs, repair berms, and projects involving structures over Railroads require scopes to be defined to ensure communication, coordination and collaboration between all project stakeholders/offices involved with survey, environmental, design (Bridge office for Structure repairs and another design office for plans assembly), ROW and construction.
Slide repair, erosion repair & pipe repair	Scope required to initiate necessary coordination and collaboration between the responsible design office/Project Manager, Geotechnical office, Bridge office & possibly ROW.
Projects with Railroad crossings within project limits	Scope required to ensure the following: Designer/Project Manager knows to include provisions related to Railroad coordination and protective insurance, Highway-Rail Safety engineer knows Special Provisions related to Railroad coordination and protective insurance must be created, and to allow sufficient time in project schedule for Railroad plan review and facilitate obtaining required Railroad Permits.

Table 2-1 Projects with Formal Scopes

The current edition of the *A Policy on Geometric Design of Highways and Streets* introduces new definitions of project types:

1. New Construction
2. Reconstruction
3. Projects on Existing Roads

Definition of design standards to be followed for these 3 project types are as follows:

1. New Construction – 4R – Reconstruction standards will be followed.
2. Reconstruction– 4R – Reconstruction standards will be followed.
3. Projects on Existing Roads – Project will follow 1R, 2R or 3R Design Standards as defined below.

SDDOT design standards for New Construction and Reconstruction projects may be found in other chapters of the Road Design Manual.

Projects on Existing Roads - 1R, 2R and 3R Projects

Projects of this type are intended to:

- Address **Condition** related needs of the roadway facility and structures
- Address **Safety** related needs identified by experienced or predicted crash patterns
- Enhance current or anticipated traffic operations, **Capacity**, by reducing congestion. 3R projects may include Capacity improvements such as adding turn lanes at intersections, but major Capacity improvements such as adding passing lanes, auxiliary lanes or changing typical section will be 4R projects.

While the primary objective of most 1R and 2R projects address **Condition** related pavement preservation, 3R projects will address **Safety** and/or **Capacity** related needs while rehabilitating a segment of highway or structure. 3R projects may include geometric improvements and roadway widening to enhance traffic operations, reduce crashes or improve other roadway elements.

The requirements for each type of project are listed below.

1R Project (Restoration/Preservation Projects)

1R Definition – Project based on strategies to maintain or extend the service life. This type of project will provide a maximum of 1.5" wearing course of asphalt, and may include work types such as:

- Replacement of wearing course
- Chip seals
- Micro-surfacing
- Crack seals
- Structure preservation (epoxy chip seals and structure painting)
- PCCP repairs
- Other improvements as identified in the Preservation Project Eligibility Guidelines located in Appendix A

These projects are typically identified through one of the following ways:

- Annual statewide review of pavement condition on all routes and confirmed through the Region Inspection process which occurs each Fall
- Asset management programs and analysis (dTIMs (Pavement management), Bridge management software
- Recommendation from Area, Region or Region Bridge personnel

1R Purpose – The purpose of a 1R project is to preserve the existing pavement layers and structures.

1R Design Standards – Existing roadway width should be maintained, and guardrail height should be reviewed if the roadway elevation is changed. 3R requirements will not be reviewed and a formal design exception is not required.

1R Scoping Consideration – Most 1R projects do not have a formal scope developed by Project Development. 1R projects which may require a formal scope to be defined in the C2C software are those requiring some degree of communication, coordination and collaboration between multiple offices or work centers to accomplish the Project Delivery process. However, a Project Manager for any 1R project may request that a formal scope be developed by Project Development at any time.

1R Safety Considerations – Signing, pavement markings and rumble strip related needs on the highway segment to be reviewed.

- Refer to Chapter 7 – Cross Sections for centerline, edge line/shoulder and transverse rumble strips/stripes guidance to ensure these typical safety measures will be properly addressed with the project.
- Based on 1R projects' purpose and design standards which must be met, clearzone requirements are not required to be reviewed.

1R Environmental Considerations –

- 1R projects with a formal scope defined, Environmental review and certification will be based on scope and preliminary design detailing specific project impacts.
- 1R projects with no formal scope defined (asphalt surface treatments, rout and seals, epoxy chip seals, crack sealing, etc.), Administration/Environmental Staff review new STIP once Approved and conduct review for projects which may be certified.

1R Highway-Rail Crossing Considerations – Construction work or activities within 25' of track will require the Railroad to flag to safeguard Railroad's operations and property. Railroad flagger(s) and protective services and devices will be required when work or activities are located over, under, or within twenty-five (25) feet measured horizontally and perpendicular from centerline of the nearest track, when cranes or similar equipment positioned outside of 25-foot area from track centerline could foul the track in the event of tip over or another catastrophic occurrence. Any SDDOT project on the roadway within 25' of the Railroad, or on a structure over/under the Railroad, will require notification and coordination with the Railroad.

1R Scheduling Considerations – Typically, 1R projects are driven by needs associated with pavement or structure Condition. Projects are typically programmed in years 1-4 of the STIP, depending on project type, work included and coordination with Project Manager.

Determination Between 2R and 3R – Refer to Table 2-2 for determination between 2R and 3R projects.

Improvement or Roadway element	2R	3R
Roadway	Resurfacing and restoration to extend serviceability. May be Mill & AC Resurfacing, or AC Resurfacing (On AC or PCC); roadway widening limited to adding wedge of material to edge of shoulder/top of inslope to maintain surfacing width.	Resurfacing, Restoration and Rehabilitation without limitation on pavement design strategies. In addition to addressing surfacing or structure related needs, 3R projects are also meant to enhance safety. May be AC Resurfacing, or PCC overlay; AC projects may include full-depth reclamation (FDR) of existing surfacing.
Structure	Structure rehabilitation and preservation treatments such as deck overlay, membrane & AC overlay, bridge rails, joints, abutments, bents, girders, bearings, approaches and scour.	Structure repairs including reconstructed structure elements such as deck replacements, raise superstructure and structure widening.
Pipe	Purpose of 2R is to extend serviceability of roadway elements such as pipe. A 2R project may include pipe clean-out, repairs, and replacements as necessary to ensure serviceability of roadway.	3R projects, having been identified based on opportunities to enhance safety may include the full range of pipe maintenance, repairs and replacement.
Add Turn-lanes	If turn-lanes are needed, project is 3R based on opportunities to enhance safety.	3R projects, having been identified based on opportunities to enhance safety may include the full range of potential roadway improvements. If a Safety or Capacity related need indicates turn-lanes are needed at 1 location in a project's limits, review and analysis must be completed to determine if there are other turn-lane or grading related needs in project limits.

Table 2-2 Criteria to Determine if a Project is 2R or 3R

Improvement or Roadway element	2R	3R
Roadway widening to meet shoulder requirements	Roadway segments must meet minimum combined lane and shoulder width requirements to be considered as 2R. Roadway widening to meet shoulder/roadway width requirements is outside the purpose of a 2R project. Roadway widening limited to adding wedge of material to edge of shoulder/top of inslope to maintain surfacing width.	If roadway widening is needed on a 3R resurfacing project, 3R width requirements must be met at a minimum; but since roadway width has such a high degree of influence on roadway safety, 4R width requirements may be considered.
Inslope/Approach/ Backslope flattening	If any of these improvements are included, project is 3R based on safety enhancements and project related impacts outside shoulder limits	These types of safety enhancements lead to 3R designation.
Guardrail addition or improvement	May be included	May be included
Shoulder paving or widening to support typical section	May be included	May be included
* Clear Zone improvements	*	*
Signing improvements	May be included	May be included
Shoulder and Centerline rumble-strips	May be included	May be included
Striping and delineation	May be included	May be included
Superelevation restoration	May be included	May be included

* Clear zone criteria are commonly misunderstood to be a design standard, but instead should be considered to represent a guideline for best practice on rural highways where feasible and practical.

Table 2-2 Criteria to Determine if a Project is 2R or 3R (continued)

2R Project (Restoration and Resurfacing)

2R Definition **–** Includes restoration and resurfacing work with additional pavement structure to extend serviceability of the roadway elements, pavement, and structures for the projects design life. All routes that meet 3R minimum combined lane and shoulder width requirements are eligible except the Interstate System. 2R projects are intended to address **Condition** related needs and while the need for a 2R project is defined by pavement needs, the restoration of all roadway elements within project limits needs to be considered in delivery of a 2R project. Routes identified as a recreational, scenic, or non-state significant route in Table 2-3 are 2R eligible regardless of existing width. This project type may include minor surface widening to achieve minimum roadway width standards, minor safety work, guardrail repair or replacement, structure rehabilitation or preservation (deck overlay, membrane & AC overlay, bridge rails, joints, abutments, bents, girders, bearings, approaches, scour), and preservation of other highway elements to preserve the integrity of the facility's design life.

Typical Improvements made in 2R and 3R projects in addition to resurfacing are:

- Guardrail repair, replacement, and new installation
- Minor surface widening to achieve minimum 3R roadway width standards (combined travel lane plus shoulder width) as shown in Chapter 7 – Cross Sections, Tables 7-2 and 7-3,
- Shoulder paving, or minor widening to support typical section width
- Clear zone improvements
- Signing improvements
- Shoulder and Centerline rumble-strips
- Striping and delineation
- Super-elevation restoration
- Drainage improvements, including pipe and erosion repair

If, through safety analysis, improvements are both reasonable and feasible, the segments where improvements are planned will be at 3R standards.

2R projects are typically identified through an annual statewide review of pavement condition on all routes and confirmed through the Region Inspection process which occurs each Fall.

Scenic, Recreational or Non-State-Significant Routes Eligible for 2R	
SD 13	I 90 P – I 90 to White Lake
US 14 – Fm US 14B to US 14B (Brookings)	I 90 Loop – Chamberlain/Oacoma
US 14A - US 85 to Spearfish	I 90 Loop – Mitchell
SD 15 – W of I-29 to I-29	SD 101
US 16A - SD 36 to SD 244	SD 130
SD 18 P	SD 144
SD 19A	SD 153
SD 20 – 2.2 mi W of I-29 to I-29	SD 158
SD 20 – Camp Crook west	SD 203
SD 20 P	SD 224
SD 21 – SD 28 to Hayti	SD 231 – Rapid City to Blackhawk
SD 22 – Hazel to US 81	SD 239
SD 26	SD 240 – In Badlands National Park
SD 29 P	SD 244
SD 30 – W of I-29 to I-29	SD 247
SD 37 P	SD 248 & 248 P
SD 38 – Mitchell to I-90 E of Hartford	SD 249
SD 38 P	SD 251
SD 40 – Keystone to Hermosa	SD 253
SD 42 – US 281 to Davison County Line	SD 258
SD 49	SD 271
SD 50 L	SD 314
SD 53	SD 324
SD 63 – US 18 to I-90	SD 471
SD 71 – NE line to 5.5 mi S of E	SD 473
US 81 – US 212 to I-29	SD 1804
SD 87 - US 385 north to US 16	SD 1806 & 1806 P
SD 89 - US 16A to SD 87	

Table 2-3 Scenic, Recreational or Non-State-Significant Routes Eligible for 2R

2R Purpose – The purpose of a 2R project is to address **Condition** related needs associated with resurfacing projects. A 2R project will extend the serviceability of both the existing roadway pavement and any structure with the identified project limits to meet the functionality of the highway facility.

2R Design Standards – Roadway width shall meet the minimum 3R combined lane and shoulder widths, refer to Chapter 7 – Cross Sections, unless the highway segment is identified as a recreational, scenic or non-state significant route as shown in Table 2-3. If the route is identified as a recreational, scenic, or non-state-significant the existing roadway width should be maintained. 3R design standards should be met on the roadway surface (cross slope and super- elevation), including signing in accordance with the MUTCD. The remaining 3R design standards for items outside of the roadway should reviewed, but it is not the intent to meet all 3R standards. Review of the inslope flattening and guardrail protection criteria should be completed, refer to Chapter 10 – Roadside Safety. A formal design exception is not required. If enhancements to the roadway section are made, they should meet 3R design standards. A review of the recommended safety improvements is required. This information is available through Safety Module of the Asset Management System and will be updated on an annual basis.

2R Scoping Considerations – Projects are either 2R or 3R, there are not 2R projects that include 3R improvements. Factors which separate 2R from 3R are as follows:

1. Combined road and shoulder width
2. The need to address Safety related needs within project limits, in addition to the pavement or structure Condition related needs otherwise defining need for project.

Projects developed as 2R projects will be limited in scope to address **Condition** related elements as necessary to maintain serviceability of all roadway elements within project limits.

2R and 3R design decisions are based on an assessment of the safety and traffic operational performance of the existing road and the cost-effectiveness of potential design improvements. Although formal design exceptions are not required on 2R projects crash history and safety performance will be analyzed to determine if any identifiable crash patterns may be related to any of the 10 controlling criteria defined in the Design Exception section of this chapter.

Class S resurfacing projects are now classified as 2R projects, due to the longer life expectancy of the treatment as compared to other 1R treatments and the likelihood that pipe repair and guardrail replacement will be included in the project.

2R Safety Considerations - Signing, pavement markings and rumble strip related needs on the highway segment to be reviewed.

- Ensure signing is in accordance with MUTCD standards. Horizontal curves shall be ball banked after paving to ensure curve warning signs are current with recommended level in Table 2-6.
- Refer to Chapter 7 – Cross Sections for centerline, edge line/shoulder, and transverse rumble strips/stripes guidance to ensure these typical safety measures will be properly addressed with project. Due to the need to maintain effectiveness of rumble strips following application of Chip Seals on Asphalt Concrete pavement, standard rumble strips will be required on any resurfacing project on routes with ADT >1000, with exceptions in the rumble strips adjacent to residences.

2R Environmental Considerations – The Environmental Office will complete an informal review which may include field verification. Information required by the Environmental office to conduct the informal review includes project scope and preliminary design defining project and detailing project related impacts.

2R Highway-Rail Crossing Considerations – Construction work or activities within 25' of track will require the Railroad to flag to safeguard Railroad's operations and property. Railroad flagger(s) and protective services and devices will be required when work or activities are located over, under, or within twenty-five (25) feet measured horizontally and perpendicular from centerline of the nearest track, when cranes or similar equipment positioned outside of 25-foot area from track centerline could foul the track in the event of tip over or another catastrophic occurrence. Any SDDOT project on the roadway within 25' of the Railroad, or on a structure over/under the Railroad, will require notification and coordination with the Railroad.

2R Scheduling Considerations – A majority of 2R projects are driven by needs associated with pavement Condition. 2R projects are typically programmed in the 5th year of the STIP to accommodate acquisition of ROW/easements as may be necessary for pipe, erosion, channel, or slide repair. It is preferred by the to have at least permanent easement to allow for future maintenance of pipe/RCBC ends, as well as any riprap or gabion baskets to control erosion. If, through scoping the project, it is determined that no work is required beyond the limits of the structure or beyond 10' from the edge of shoulder/top of inslope then a 2R project may be advanced to years 2-4 in the STIP, pending coordination with Project Manager.

In general, there are three types of assessments conducted to determine whether a design improvement is appropriate in conjunction with a resurfacing (2R or 3R) project:

- Safety review based on crash history review and analysis – review crash data for a minimum of 5 years to identify potential crash patterns based on actual crash reports, consideration of crash severities, types, location, and average characteristics. Could include preparation and review of intersection collision

diagrams and comparison of intersections and segments to average crash frequencies of similar intersections and segments.

- Traffic operational analysis – If the current traffic operational level of service for a roadway, or the anticipated LOS at any time during the service life (typically 12-20 years) of the planned project is less than target LOS, then a design treatment to improve the LOS may be appropriate. Examples of design treatments that may improve LOS are lane widening, shoulder widening, and addition of turn-lanes.
- Cost-effectiveness analysis – could be Life Cycle Cost analysis of pavement related items or Benefit/Cost ratio based on predictive safety benefit. This type of assessment considers the need for design improvements based on potential crash risk, whether that risk has already resulted in crashes or not. Cost-effectiveness may be based on predicted crashes only, or a combination of both observed and predicted.

3R Project (Restoration, Resurfacing and Rehabilitation)

3R Definition – Restoration, resurfacing and rehabilitation of an existing pavement or structure using a full range of pavement and structure design strategies. This project type may include:

- Asphalt resurfacing
- Asphalt surfacing on PCCP, PCCP overlay, full-depth reclamation of existing surfacing, widening to provide for standard shoulder widths or auxiliary lanes, safety improvements, reconstructed structure elements (deck replacement/raise superstructure) and structure widening. The project will likely require work outside of the existing lanes and may include segments of roadway reconstruction.

3R projects are typically identified through an annual statewide review of pavement condition on all routes and confirmed through the Region Inspection process which occurs each Fall.

Interstate projects involving work that meets 3R project definition (restoration, resurfacing and rehabilitation) may be scoped and designed based on AASHTO Interstate geometric design standards that were in effect at the time of original construction or inclusion into the Interstate system.

3R Purpose – The purpose of a 3R project is to preserve and extend the life of existing highways and structures (**Condition**) while enhancing highway **Safety**. Safety enhancement is an essential consideration, and 3R projects are to be developed and completed in a manner that considers and includes appropriate safety improvements. These 3R standards may be utilized on non- Interstate Systems passing through cities, towns, and urban areas. While fundamentally focused on improving Condition of roadway elements, Capacity needs may also be addressed, such as with the addition of turn lanes when volume warrants are met (see Chapter 15 for turn lane volume warrants).

3R Design Standards – Roadway elements should meet requirements identified in this Chapter as well as Chapter 7 – Cross Sections and Chapter 10 – Roadside Safety. While the primary objective of most 3R projects is pavement preservation, the development of a 3R project provides an opportunity for geometric design improvements to enhance traffic operations, reduce crashes, improve drainage, or improve the roadway in other ways. These 3R standards are a reduced standard from 4R and deviations to 3R standards should be rare. A higher standard may be considered with proper justification. An evaluation of safety improvements is required through the Safety module of the Asset Management System and is updated annually.

3R Scoping Considerations - Geometric design improvements should be considered as part of a 3R project in the following situations:

- An analysis of the crash history of the existing road identifies one or more crash patterns that are potentially correctable by a specific design improvement, or
- An analysis of the traffic operational level of service (LOS) indicates that the LOS is currently lower than target LOS, see Road Design Manual Chapter 15 - Traffic, or will become lower than the target LOS within the service life of the planned pavement resurfacing, or
- A design improvement would need to reduce an adequate number of crashes over its service life to be cost-effective, i.e., the anticipated crash reduction benefits over the service life of the project should exceed the improvement implementation cost.

In the absence of any of the situations defined above, there is no indication that a geometric design improvement is needed, and existing features should remain in place.

Typical Improvements made in 3R projects in addition to resurfacing:

- Intersection modifications, including addition of turn-lanes & other enhancements
- Inslope, backslope or approach slope flattening
- Roadway widening to add shoulder width is a **Safety** driven improvement, which technically qualifies for meeting 3R design requirements. SDDOT philosophy and understanding with FHWA regarding shoulder widening projects requires that we meet 4R shoulder width requirements (refer to Chapter 7 – Cross Sections, Table 7-1) and 30’ clear zone requirements when adding shoulders using Federal Highway Safety funds.
- If shoulder widening is included in project scope, and Federal Highway Safety funds are not being applied based on Benefit/cost ratio or other factors, 3R width requirements must be met at a minimum.
- Full depth removal of asphalt surfacing, as required based on condition, performance, and recommendation from Materials & Surfacing.

On 3R projects where widening is needed to meet resurfacing standards, consider the economic and safety benefits of widening to new construction standards. At a minimum, 3R roadway width requirements must be met on 3R resurfacing projects. On projects

designated as Shoulder Widening projects 4R requirements for shoulder width and 30' clearzone requirements shall be met; this requirement is necessary due to an agreement with FHWA related to the use of Federal Safety funds for Shoulder Widening projects.

For 3R projects on rural highways on the National Highway System off the Interstate refer to Table 2-4. For 3R projects on rural highways not on the National Highway System refer to Table 2-5.

Cross Slope	• Superelevation—7% Maximum • Maintain existing cross slopes on resurfacing projects. • Correcting cross slopes to AASHTO criteria should be considered when cost effective.
Bridges to Remain in Place	• Structural capacity—HS-20 operating rating • Minimum width—28 feet
Minimum Vertical Clearance	14 feet (Signing in accordance with current policy)

Table 2-4 3R Cross slope and structure standards for Non-Interstate National Highway System

CURRENT ADT	**<1499**	**≥1500**
Cross Slope	• Superelevation--7% maximum • Maintain existing cross slopes on resurfacing projects. • Correcting cross slopes to AASHTO criteria should be considered when cost effective.	
Bridges to Remain in Place	1. Structural Capacity HS-15 operating rating ≤ 1500 ADT HS-20 operating rating > 1500 ADT **Minimum Width**	
	24 feet	26 feet
Minimum Vertical Clearance	14 feet (Signing in accordance with current policy)	

Table 2-5 3R Cross slope and structure standards for Non-Interstate State Highways not on the National Highway System

Design Speed – Refer to the section on Design Speed on page 2-7.

Design Traffic Volume – Existing volume should be used for resurfacing and surface widening projects.

Shoulder surfacing type refer to Chapter 7 – Cross Sections.

20-year projected volumes should be used for determining shoulder width for shoulder widening projects.

If a criterion isn't specifically addressed in Chapter 7 – Cross Sections, Table 7-2 or 7-3, follow the current edition of the American Association of State Highway and Transportation Officials (AASHTO) *Geometric Design of Highways and Streets, Design Manual* or SDDOT policies.

Bridges to Remain in Place – Bridges on 3R projects that do not meet the criteria in Table 2-4 or 2-5 should be either modified to meet the criteria or considered for replacement to new structure standards. A significant remaining functional life could be the basis for a decision to keep the structure via design exception.

Horizontal Alignment – (refer to Chapter 5 - Horizontal Alignment)
Verify horizontal alignment is adequate for the posted speed, or advisory signs are provided.

The ball bank indicator should be used to check horizontal curves. The feasibility of improving the superelevation should be considered and may be accomplished when economical. Rollover criteria (7% max.) should be met. Refer to Table 2-6 which describes the actions to be taken for various speeds and ball bank readings.

SPEED (mph)	Ball Bank Indicator	ACTION
Any Speed	$\leq$ 10°	No adjustment in superelevation required. No special signing required.
$\geq$ 45	> 10°	Place curve sign and advisory speed plate if ball bank indicator reads >10° at speeds below the posted speed limit. Example: Ball bank reading = 10° at 62 mph on highway posted at 65 mph. Advisory speed plate shows 60 mph.
$\leq$ 44	> 10°	Corrective action by reconstructing the curve to a more desirable degree of curvature should be made where deemed feasible. Documentation of restrictions and/or impacts should be made for no corrective action. If no corrective action is taken, place curve sign and advisory speed plate.

Table 2-6 Ball Bank Indicators

If reconstruction of existing curve is not reasonable or feasible, consider the following mitigation measures:

- Advanced Signing
- Installation of Rumble Strips
- Surfacing of Shoulders

Vertical Alignment – (refer to Chapter 6 - Vertical Alignment)
NCHRP Report 783 indicates that limitations on stopping sight distance can influence Safety when the presence of a crest vertical curve hides a horizontal curve, intersection, or driveway from an approaching driver. If design traffic volume is 1,500 or less, existing curves should meet a design speed of no less than 20 mph below overall project design speed. Curves meeting this criterion should be analyzed for safety and documented in the project file. Where stopping sight distances less than AASHTO criteria are present, review for history of crashes and the presence of hidden features such as horizontal curve, intersection, or driveway. It is not the intent of 3R projects (projects on existing roads) to correct deficiencies in (vertical) geometry unless there is a hidden curve, intersection, or crash pattern.

If the design speed criterion is not met, analyze whether re-construction standards are feasible and reasonable.

If reconstruction of an existing vertical curve is not determined reasonable or feasible, consider the following mitigation measures:

- Traffic control devices
- Shoulder widening
- Driveway relocation
- Passing Lanes

Maximum Grade – (refer to Chapter 6 - Vertical Alignment)
The existing highway grade should be compared to maximum grade design criteria that corresponds to the design speed of the project.
If the maximum grade % is exceeded, analyze whether reconstruction to meet standards are feasible and reasonable.

If reconstruction of an existing grade is not determined reasonable or feasible, evaluate:

- Climbing Lanes (refer to Chapter 6 - Vertical Alignment)
- Advanced signing
- Driveway relocation

3R Safety Considerations - In order to identify opportunities for improvement of safety to be included in project, the following should be among the first steps of scoping:

- Evaluate crash records from the past five years for trends in the type, frequency and severity of crashes and their relationships to roadside obstacles.
- Review the recommended safety improvement segments for incorporation. This information is available through the Safety Module of the Asset Management System.
- Compare the crash rate on the segment to the weighted crash rate on that highway system classification in South Dakota.
- Make sure all signing and pavement marking meet the criteria in the Manual on Uniform Traffic Control Devices.
- If a turning lane or another safety enhancement will be added, ensure the change meets current 3R standards. If elements of the project require reconstruction to enhance safety, such as horizontal curves, vertical curves, realigning intersections to eliminate skew, etc.; it may be determined that meeting full reconstruction standards is appropriate.
- Review Chapter 7 – Cross Sections of the RDM for centerline, edgeline/shoulder, and transverse rumble strip/stripes guidance.
- Ensure signing is in accordance with MUTCD standards. Horizontal curves shall be ball banked after paving to ensure curve warning signs are current with recommended level in Table 2-6.
- Superelevation at curves should be reviewed to ensure they are consistent with the design speed of the curve.
- Wildlife Vehicle Collisions (WVC) should be reviewed to identify hotspots. If hotspots are found, then a further investigation should be done to see if crossing improvements can be made at existing structure locations. Review WVC environmental guidance.
- Due to the need to maintain effectiveness of rumble strips following application of Chip Seals on Asphalt Concrete pavement, standard rumble strips will be required on any resurfacing project on routes with ADT >1000, with exceptions in the rumble strips adjacent to residences.

Fill Height and Inslope – If the fill height is greater than 10', inslope is steeper than 3:1 and ADT is greater than 1000, inslope flattening or guardrail protection should be considered.

If the ADT is 1000 or less and the inslope is steeper than a 3:1, it is not considered cost effective to flatten inslopes or provide guardrail unless crash patterns indicate a problem. However, an inslope steeper than 2:1 for more than a 1000’ continuous length should be documented by a design deviation if it is not improved.

Refer to Chapter 10 – Roadside Safety, Figures 10-3 and 10-4.

Clear Zone and Lateral Offset – Refer to Chapter 10 - Roadside Safety for general guidance on clear zone distance and clearzone regarding the following:

- Transverse Culverts to Main Line
- Approach Pipe
- Approach Slope Flattening Barrier design.

Any roadside obstacles defined in Chapter 10 – Roadside Safety which are allowed to remain within the preferred clear zone shall be documented by design deviation.

On projects or segments of projects with design speed of 40 mph or less, existing lateral offset should be compared to minimum lateral offset for 3R projects. The minimum lateral offset is 1'.

Capacity - Studies have proven that the addition of passing opportunities can increase both the capacity and safety of a highway corridor. When reviewing the safety performance of a resurfacing project, consideration must be given to possible crash patterns related to lack of passing opportunities, especially as ADT's approach 2000.

3R Environmental Considerations – 3R projects are intended to include safety mitigation measures such as roadway widening or changes to roadway geometry are possible. This may likely lead to more significant environmental impacts, requiring that SDDOT conduct a full NEPA review of the project limits to include temporary right-of-way easements and state furnished option sites. Information required by the Environmental Office to conduct a full NEPA review include project scope and preliminary design.

3R Highway-Rail Crossing Considerations – Construction work or activities within 25' of track will require the Railroad to flag to safeguard Railroad's operations and property. Railroad flagger(s) and protective services and devices will be required when work or activities are located over, under, or within twenty-five (25) feet measured horizontally and perpendicular from centerline of the nearest track, when cranes or similar equipment positioned outside of 25-foot area from track centerline could foul the track in the event of tip over or another catastrophic occurrence. Any SDDOT project on the roadway within 25' of the Railroad, or on a structure over/under the Railroad, will require notification and coordination with the Railroad.

3R Scheduling Considerations – A majority of 3R projects are driven by needs associated with pavement Condition. 3R Projects are typically programmed in the 5th year of the STIP to accommodate acquisition of ROW/easements as may be necessary for pipe, erosion, channel, or slide repair. It is preferred by the Department to have at least permanent easement to allow for future maintenance of pipe/RCBC ends, as well as any riprap or gabion baskets to control erosion. If project scope determines that the project will include significant work beyond surfacing, such as safety mitigation measures or pipe/RCBC replacement or repairs which create environmental impacts or need for ROW, project schedule may require that project moves to year 6 pending coordination with Project Manager.

4R Project (Reconstruction or Construction)

4R Definition - Reconstruction projects provide for a full range of design strategies, that utilize the existing roadway alignment or make only minor changes in roadway alignment and involve a change in the basic roadway type. A project changing the basic roadway type will include improvements to address the need for additional continuous travel lanes for added capacity, auxiliary lanes, recovery areas, new or reconstructed structures, and upgrade of geometric and other highway elements to meet design standards. Retaining the existing alignment means that existing constraints in the current roadway ROW and adjacent to existing ROW will influence design decisions. Full Depth Reclamation projects or PCC Remove/Replace projects are not required to be 4R Reconstruction projects even though the entire pavement structure may be removed and replaced. Performance measures for the existing roadway facility as well as forecast of future performance will inform design decisions.

Construction projects construct roads on new alignment where no existing roadway is present and provide for a full range of design strategies. The main difference between Construction and Reconstruction is that Construction has fewer constraints based on not being restricted to a previously established alignment and the specific characteristics reflected by the existing alignment on the surrounding environment.

4R Purpose - The purpose of a Reconstruction project is to completely reconstruct the existing highway infrastructure to address Condition, Safety or Capacity related needs. Condition of roadway and structure elements, experience or predicted Safety performance and current or projected Capacity needs may individually or in combination result in sufficient need that a change in basic roadway type becomes necessary to support SDDOT standards and goals. Although some elements of the roadway may be re-used, those elements should meet the design standards.

The purpose of a Construction project is to adapt to new or changing transportation needs that require new segments of roadway to be constructed. Although some elements of an existing roadway may be re-used, those elements should meet the design standards below.

4R Design Standards - The roadway elements should meet the criteria listed in the SDDOT Road Design Manual. If design elements are not specifically addressed, they should meet the latest version of the AASHTO Policy on Geometric Design of Highways and Streets, and other elements identified in 23 CFR 625.

Construction and reconstruction projects on the Interstate system will at a minimum meet the standards detailed in *A Policy on Design Standards – Interstate System.*

4R Scoping Considerations – 4R projects must be scoped based on projected ADT (20 years from construction) and are intended to address all **Safety**, **Condition** and **Capacity** related needs.

Geometric design elements - any existing vertical and horizontal roadway elements which do not meet design standards for 5 mph over the posted speed limit (ideally) or meet posted speed limit conditions (at a minimum) should be reconstructed to meet design criteria for Chapter 5 - Horizontal Alignment and Chapter 6 - Vertical Alignment.

If any of the following limitations are present, design speed of geometric improvements at individual locations should be increased to the maximum extent feasible with reference to posted speed, and a design exception shall be completed:

- Physical controls – topography, watercourses, land use and manmade features.
- Environmental considerations – effect on adjacent land use, community impacts, ecologically sensitive areas.
- Economics – construction costs, right-of-way costs, utility impacts, operating and maintenance costs.

Typical Improvements that need to be considered when scoping 4R projects:

- Intersection modifications, including addition of turn-lanes and realignment of mainline or intersecting road to improve sight distance or meet control of access guidelines.
- Lane width, shoulder width, inslopes and backslopes to be reconstructed in accordance with Chapter 7 – Cross Sections. Review of locations where snow drifting is a consistent issue should be identified by working with Area Office/Maintenance personnel and noted in the scope as location were flattening the backslope should be considered in design to accommodate additional snow storage.
- Typical section – in a rural setting if projected ADT (20 years from construction) is less than 1500 a detailed traffic analysis may not be necessary. On rural 4R projects with projected ADT greater than 2500 and all Urban 4R projects, a traffic analysis should be completed to provide recommendations on number of lanes needed to meet **Capacity** needs. On rural 4R projects converting an existing 2 lane to a 4 lane, scope should define typical section elements to include median width and type (depressed or raised).
- Both interim and final surfacing needs to be discussed when scoping 4R projects. Grading (4R) projects which will have Asphalt Concrete for final surfacing will typically include interim surfacing to carry traffic through the first winter season following reconstruction of the roadway. Final Asphalt Concrete surfacing will be placed the year following reconstruction. AC surfacing project should be created and added to STIP for year following reconstruction and included in scope for 4R project, if applicable. If final surfacing is determined to be PCC, surfacing will be included with grading project.

- Structures – any structures, bridges or RCBC, which are nearing the end of their service life should be replaced with a 4R project. In some cases, RCBC's may be determined to need replacement rather than extending to accommodate roadway widening with reconstruction.
- Traffic Control/Maintenance of traffic – discussion shall occur during scoping to determine if road will remain open to traffic or if it may be closed during construction & only open for local traffic. If road is to remain open to accommodate traffic, scope should include guidance on how traffic will be maintained through structure replacement locations. This could include building new bridge adjacent to existing and using existing bridge to carry traffic, identifying the need for a temporary structure or specifying that an on-site diversion will be necessary.
- Bicyclists, Pedestrians and ADA – 4R projects must consider needs related to all modes of transportation. Even in some suburban/rural settings a shared use path may be needed to connect communities with housing developments and recreation areas. Any shared use paths or sidewalks added or reconstructed with a 4R project must meet the ADA guidelines in Chapter 16 - Miscellaneous.

Design Speed - Refer to the section on Design Speed on page 2-7.

4R Safety Considerations –

- Safety – Wildlife Vehicle Collisions (WVC) should be reviewed to identify hotspots. If hotspots are found further investigation is necessary to determine if crossing improvements can be made at existing structure locations. If a hotspot is identified at a location where a structure is replaced analysis should be completed to see if the structure size can be adjusted to accommodate a wildlife crossing. Review WVC environmental guidance.
- Evaluate crash records from the past five years for trends in the type, frequency and severity of crashes and their relationships to roadway geometry or roadside obstacles.

4R Environmental Considerations – 4R projects involve either new construction or reconstruction of existing roadways and structures. This type of project typically leads to environmental impacts, requiring that SDDOT conduct a full NEPA review of the project limits to include temporary right-of-way easements and state furnished option sites. Information required by the Environmental Office to conduct a full NEPA review include project scope and preliminary design.

4R Scheduling Considerations – Due to complexity of coordination and design of project, and ROW needs, 4R projects typically enter the STIP in year 7 or 8, to allow sufficient time for project delivery. Other factors which influence the 7-to-8-year timeframe to deliver a 4R project include a variety of activities, such as survey, environmental and geotechnical related activities which have seasonal limitations defined by outdoor work and South Dakota climate. Refer to example primavera Gannt Chart on the SDDOT Deliverable Files web page.

DESIGN STANDARDS FOR INTERSTATE LOCAL CROSSROAD

The following provides guidance for project planning or design decisions on Interstate projects which require resurfacing or reconstruction efforts on Local Road crossroads (City, County, Township), such as for interstate structure replacement or interstate resurfacing projects.

Vertical Clearance - Refer to the current *SDDOT Local Roads Plan*. Site specific conditions may require additional clearance

Roadway Width - For Local Road (County, City, Township) crossroads over or under the Interstate:

- At Interchanges – Refer to Chapter 7 – Cross Sections, Table 7-1.
- At Crossroad Only - Refer to the current *SDDOT Local Roads Plan* and the current *AASHTO publication A Policy on Geometric Design of Highways and Streets* based on functional classification. However, shoulders on bridges at Crossroad over should be no less than 4' wide.

A minimum 22' roadway width is desired. In some cases, it may be desirable to decrease the width to < 22' due to ADT or one-way traveled roadway.

Typical Cross Section - Refer to the standards and typical cross section information outlined in the current *SDDOT Local Roads Plan*.

Curb & Gutter - SDDOT standards apply.

Clear Zone – Refer to Chapter 10 – Roadside Safety.

Guardrail - SDDOT design standards, standard plates, and guardrail types apply. If minimum clear zone is not met, guardrail shall be installed. Where roadside barriers are proposed, it is desirable to provide a minimum offset of 2' from the traveled way to the barrier whenever practical

DESIGN EXCEPTIONS

Designers and engineers are faced with many complex tradeoffs when designing transportation facilities. A good design balances cost; safety; mobility; social, natural and environmental impacts; and the needs of a wide variety of roadway users.

Highway design criteria that have been established through years of practice and research, form the basis by which designers achieve this balance. These criteria are expressed as minimum dimensional values or ranges of values for various elements of the three-dimensional design features of the highway. The criteria are intended to deliver an acceptable, cost-effective level of performance (traffic operations, safety, maintainability, and constructability). The criteria are updated and refined as research and experience increase knowledge in the fields of highway engineering, traffic operations, and safety.

Designers are trained to use accepted design criteria throughout the project development process. Striving to meet design criteria is important because it is the primary means by which a high-quality roadway will be produced. A highway or roadway that reflects full compliance with accepted design criteria decreases the probability that safety or traffic operational problems will develop. Thus, using design values that lie within typical ranges provides for a high degree of quality control and reduced risk.

It must be recognized, however, that to achieve the balance described above, it is not always possible or practical to meet design criteria. There are a wide variety of site-specific conditions and constraints that designers encounter. Roadways have a multitude of contexts. Establishing design criteria that cover every possible situation, each with a unique set of constraints and objectives, is not possible. On occasion, designers encounter situations for which the appropriate solution may suggest that using a design value or dimension outside the normal range of practice is necessary. Arriving at this conclusion requires the designer to understand how design criteria affect safety and operations. For many situations, there is sufficient flexibility within the design criteria to achieve a balanced design and still meet minimum values. However, when this is not practical, a design exception should be considered.

The National Highway System

The National Highway System (NHS) includes the Interstate system and other routes that are principal arterials serving major travel destinations, highways that provide an important function for national defense, and highways that provide connections to other intermodal transportation facilities.

By federal regulation, FHWA is responsible for establishing design standards on the NHS (23 CFR 625) and has adopted several American Association of State Highway and Transportation Officials (AASHTO) publications as the minimum design criteria for the NHS.

Design exceptions are required on any project on the NHS when design values are used that do not meet the Controlling Criteria. FHWA has developed specific guidance on what constitutes the need for a design exception, and how design exceptions are to be studied, documented, and approved. This guidance addresses FHWA requirements for design exceptions. For additional information on FHWA's requirements, see the Guidance on NHS Design Standards and Design Exceptions: at http://www.fhwa.dot.gov/design/standards/qa.cfm. An Environmental Impact review is needed for all design exceptions on NHS projects.

Non-NHS Highways

Non-NHS projects are designed, constructed, operated, and maintained in accordance with State laws, regulations, directives, and design and construction standards. Therefore, there is no federal requirement for design exceptions on highways and streets that are not part of the NHS, regardless of funding source. However, States are encouraged to analyze situations and document exceptions on non-NHS routes in a similar fashion when design values are used that do not meet their adopted criteria.

Design Exceptions

Design Exceptions are required when any one of the Ten (10) Controlling Criteria is not met.

1. Design Speed
2. Lane Width
3. Shoulder Width
4. Horizontal Curve Radius
5. Superelevation Rate
6. Maximum Grade
7. Stopping sight distance (SSD)
8. Cross slope
9. Vertical Clearance
10. Design Loading Structural Capacity

Design decision making, and approval authority varies based on ownership of the highway in question and its functional role or classification within the nation's highway system. Broadly, roads can be considered part of the National Highway System (NHS) or other (non-NHS). Design exceptions on the Interstate and for plans, specifications and estimates, that were designated as PODI under the current Federal Oversight Agreement must be reviewed and approved by the FHWA. On routes that are not designated as PODI, the State will still follow the Design Exception process for any one of the 10 Controlling Criteria. In addition, FHWA reduced the number of controlling criteria to two (2) on low-speed highways (i.e., non-freeways with <50 mph design speed), however the State will utilize the 10 Controlling Criteria for design exceptions regardless of design speed.

Design Deviations

For those design deviations not part of 10 Controlling Criteria (e.g., clear zone, lateral offset) appropriate documentation/justification shall be provided by the Transportation Planning Engineer (TPE) or Design Engineer with approval provided by the office Program Manager. The documentation/justification will be included as part of the scope and/or project document folder. FHWA approval is not needed for design deviations. The design deviations documentation approved by the Program Manager should be sent to the FHWA Operations Engineer for their information on all Interstate projects and PODI.

DESIGN EXCEPTION APPROVAL PROCESS

A design exception is required whenever the minimum standards for the Controlling Criteria specified for the different categories of construction projects (i.e., 4R, 3R, Special Facilities, Road Design Manual, Local Roads Plan, Bicycle Facilities, etc.) are not met.

In order to evaluate whether a design exception is warranted, both the feasibility and reasonability should be reviewed for consideration.

Feasibility is a review of whether modifications can be made to the facility considering the surrounding topography, social and environmental impacts, and future maintenance. The *AASHTO Highway Safety Manual* should be used to compare the existing and future crash frequency with and without the modifications. Consultation with the department's Traffic and Safety Engineer should be done to verify crash potential.

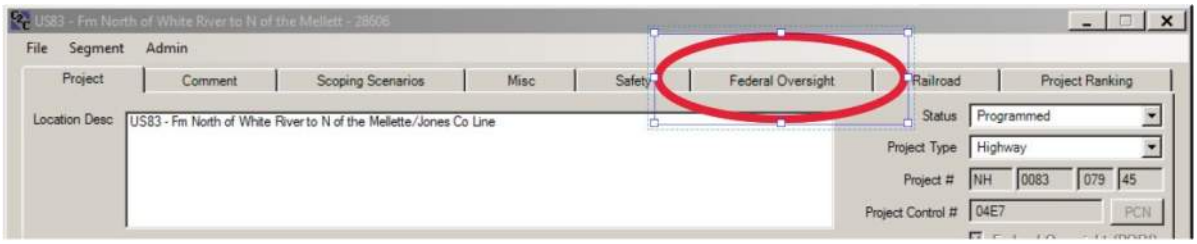
Reasonability is based on engineering judgment and cost benefit analysis of modifications outside of the pavement surface. Based on the existing and potential crash frequency, the engineer should consult with the department's Traffic and Safety Engineer to identify life cycle cost benefit of such modifications. Engineering judgment should be exercised when considering the function of the facility, traffic mix, traffic volume, and route continuity.

Exceptions to design standards should be first discussed at project scoping, project team meetings, or during reconnaissance studies. When enough data is available, agreement on standards and from which standards to request exceptions should be reached at these meetings. Requests for design exception require justification. Some considerations which **may** cause a request for an exception to the design standards are listed below:

- Excessive construction cost or cost/benefit
- Compatibility with adjacent sections
- No plans for improvement of adjacent sections in the foreseeable future
- Proposed improvements or changes in standards for the highway corridor
- Preservation of historic property or scenic value
- Additional right of way requirements
- Environmental impacts
- Low crash history and/or crash potential
- Low traffic volumes

Simply making a request for a design exception is not assurance that the request will be granted. Therefore, early submittal of the request is paramount to a smooth design process.

Design Exceptions for Interstate projects and projects selected as PODI by FHWA shall be submitted to the responsible FHWA Operations Engineer for review and approval, following DOT approvals by the responsible Program Manager or Region Engineer and the Project Development Engineer. Determination of whether a project has been chosen as a PODI by FHWA is possible by looking the project up in C2C software application as shown here:



or by using Project Search on SDDOT Intranet as shown on below:

The responsible Program Manager or Region Engineer and Project Development Engineer will review for approval design exception requests for projects without FHWA oversight. The Administration Program Manager will review design exceptions for approval on Local Government projects.

State or Federal Projects

For State or Federal Projects, a design exception should be completed as a part of the project scope and reside in the Conception to Construction (C2C) scoping module. If it is determined that a design exception is needed, the TPE shall utilize the Design Exception tab as part of the scoping process. The approval requests are sent via email to the necessary approval parties. FHWA will be emailed a copy of the Design Exception and asked for their approval, if the project is on the Interstate or has been selected by FHWA as a PODI requiring oversight. A copy of their approval or rejection will be retained within the scoping document.

All design exceptions not originating in the C2C module will be added to the module for tracking purposes.

Design exceptions on State or Federal projects need to be signed by the Office of Project Development Program Manager. In addition, design exceptions need to be signed by either:

- The Office of Road Design Program Manager when roadway design exceptions involving deviation from controlling criteria minimums in the AASHTO design specifications, SDDOT Road Design Manual or the above policy,

  or

- The Office of Bridge Design Program Manager for bridge design controlling criteria.

Local Agency Projects

Local Agency project design exceptions not on a State Highway or on the NHS follow a slightly different process. The approval of design exceptions is under the authority of the Administration Program Manager, and the intervening steps between the request and approval may differ from the standard design exception process. Designers involved in local agency contracts should contact the Local Government Engineer and review the Local Roads Plan: https://dot.sd.gov/media/documents/localroadsplan.pdf for processing design exceptions on local agency projects. Form DOT-701 at M:\DOT\Common\AllDOTForms\DOTForms401-899\DOT701_DesignExceptionRequest_Local_Government_Agency.doc should be used to process Local Agency design exceptions. The design exceptions need to be reviewed and approved by the Local Agency. The complete documentation for a design exception should be retained permanently in the project file.

Design exceptions for local government projects must be signed by the Administration Program Manager. Structure design exceptions should be co-signed by the Office of Bridge Design Program Manager.

FHWA will be emailed a copy of the Design Exception and asked for their approval, if the project has been selected by FHWA as a PODI.

PROJECT MANAGEMENT ROLES AND RESPONSIBILITIES

SDDOT uses a collaborative effort to manage projects, relying on specialized staff from a variety of Offices to efficiently deliver quality projects through the efforts of the Project Manager, Work Unit Coordinator and Project Team.

Project Management Steps or Components:

- Initiate the Project
- Plan the Project
- Execute the Project
- Monitor and Control the Project
- Close the Project

What does a Project Manager manage?

- Scope
- Schedule
- Cost
- Risk
- Quality
- Resources

Project Team Definition and Role

- Project Team includes every person/resource working on the project or involved in completion of the project.
- Team meetings may be held with the affected members.
- Individual team member responsibilities range depending on role. May include completing work tasks, providing information or recommendations, or making decisions regarding the project future.
- Team members will maintain ongoing communication with other project team members on specific project issues.
- The Team meets as needed throughout the design and development of a project, beginning with project scope, through any potential schedule changes or other issues.

Project Manager (PM) Role

- Provide input and participate in setting of initial schedule based on scope and project knowledge.
- Regularly review entire schedule at review points to remain current on project status.
- Participate in reschedule process to ensure changes to project timelines are acceptable.

- Monitors project activities in Primavera to ensure schedule is being met.
- Brings issues affecting project schedule to the attention of management immediately.
- Ensure project and requirements are reviewed.
- Expect and anticipate project changes and adapts to changes as necessary.
- Initiates and follows project control process as needed.
- Ensure any change to scope or schedule is formally reviewed and approved by project team and/or affected work center.
- Ensure needed project personnel are involved in meetings on critical points of the project (e.g., kick-off meeting, review points, scope amendments, etc.) so all parties are involved in and/or aware of project decisions.
- Ensure conflicting resources are addressed and resolved between PM and work center of other projects.
- Communicate modifications to scope, schedule, quality, STIP impacts, and so forth so others are aware and impacted projects can be adjusted if needed.
- Accurately reports project status to work units and management.
- Keeps project and activity date information current in Primavera for own work unit.
- Verify resources are assigned to projects as soon as practical.
- Assesses and manages resource workload for own work unit.
- Ensure overall project quality standards are met.
- Ensure adequate communication between team members and other project teams as needed.
- Recognizes outstanding performance and celebrates accomplishments.
- Documents lessons learned and shares with others.

Work Unit Coordinator (WUC) Role

- Provide input in setting of initial schedule related to knowledge area.
- Expect and anticipate project changes and manage changes for work center activities.
- Assess and manage resource needs for work unit.
- Regularly reviews schedule activities for work unit and remains on top of schedule/date changes.
- Ensures work center quality standards are met.
- Review project portfolios, (e.g., multiple projects or entire Fiscal Year) to identify conflicting work center resources and time commitments and works with work center Program Manager to address and resolve.
- Brings issues affecting project schedule to the attention of work center Program Manager immediately.
- Communicate with PM and other project team members when work center schedule issues are anticipated.
- Review any change to scope or schedule to determine impact to work center activities.

- Participate in project team meetings and come prepared with current project information.
- Assign resources to projects as soon as possible and manage resource workload.
- Anticipate gaps in short-term workload and be proactive in seeking work to fill the gaps.
- Anticipate future workload and resource needs and determine how those needs will be met.
- Reviews durations and labor units assigned to activities and makes recommendations for needed changes at project review points.
- Accurately report project status of said work unit.
- Keeps project and activity date information current in Primavera.
- Recognizes outstanding performance and celebrates accomplishments.
- Ensures adequate communication between team members and other projects. Seeks out information needed, and shares information needed by others.

Resource Role

- Complete assigned activities/tasks on a project.
- Maintain ongoing communication with other project team members on specific project issues.
- Keep activity/task status current by entering start and finish dates.
- Communicate with supervisors on existing and future workload, project issues, and priorities.

Project Delivery Engineer Role

- Determine network and set initial project schedule based on a STIP year and scope information.
- Ensure initial project baseline is recorded and future baselines are recorded as needed.
- Provide recommendations on initial and review point schedule changes to assist PM and WUC on schedule adjustments.
- Problem solves schedule issues.
- Review and reschedule projects based on predetermined review points of PM and WUC request.
- Work with project team to manage changes to schedule.
- Work with PM & WUC to ensure any change to scope is reflected in schedule and communicated to other project team members.
- Participates in project team meetings, initiates and facilitates meetings as needed.
- Review project portfolios, (e.g., multiple projects or entire FY) to identify conflicting resources and time commitments and assists project teams to address and resolve by making recommendations.
- Communicates modifications to schedule to project team.

- Modifies schedules in the Primavera system ensuring information is accurate and reliable.
- Document schedule changes in Primavera Notebook.
- Document scheduling lessons learned and shares with others.
- Initiate resource allocation discussions with PMs and WUCs.
- Work with Project Development Engineer to identify projects that may need to move in the STIP. This may also include follow up meetings with different project teams.
- Initiate project meetings when a schedule is in danger of falling behind due to seasonal restrictions, etc. This may also include ways to advance projects and ensure proper communication/coordination happens between the necessary offices.

Project Schedule Coordinator Role

- Determine network and set initial project schedule based on a STIP year and scope information.
- Ensure initial project baseline is recorded and future baselines are recorded as needed.
- Provide options on initial and review point schedule changes to assist PM and WC on schedule adjustments.
- Review and reschedule projects based on predetermined review points or PM and WUC request.
- Work with project team to manage changes to schedule.
- Work with PM & WUC to ensure any change to scope is reflected in schedule and communicated to other project team members.
- Participates in project team meetings, initiates and facilitates meetings as needed.
- Review project portfolios, (e.g., multiple projects or entire FY) to identify conflicting resources and time commitments and assists project teams to address and resolve by making recommendations.
- Communicates modifications to schedule to project team.
- Modifies schedules in the Primavera system as directed and ensures information is accurate and reliable.
- Defers schedule change decisions to PM and Change Control Process.
- Document schedule changes in Primavera Notebook.
- Document scheduling lessons learned and shares with others.

Transportation Planning Engineer (TPE) Role

- Provide input and participate in setting of initial schedule based on scope and project knowledge.
- Participate in reschedule process, as necessary, to ensure changes to project timelines are acceptable.
- May resolve conflicts between projects, including financial, scheduling, geographical, etc.
- Expect and anticipate project changes and adapts to changes as needed.
- Ensures any change to scope is formally reviewed and approved by PM and WUC.
- May ensure needed project personnel are involved in meetings on critical points of the project that effect the scope (e.g., kick-off meeting, scope amendments, etc.) so all parties are involved in and/or aware of project decisions.
- Communicate with team members on modifications to scope & STIP impacts, so others are aware and impacted projects can be adjusted if needed.
- May ensure adequate communication between team members and other project teams as needed.

PROJECT SCHEDULE CHANGES

Project schedule changes may be made at designated points in the project or if deemed necessary for the integrity of the schedule. Coordination will be maintained throughout project schedule review and consideration for any changes to project schedule in Primavera. This includes any changes due to STIP Revisions, Scope Amendments, and any scheduled review point or from special requests for schedule review.

All base networks and schedules are designed with predetermined Review Points built in at specific milestone points of a project's life cycle. Schedules will be reviewed at the predetermined Review Points. If the schedule review will result in changes to the current schedule, the schedule should be reviewed with the PM and any affected WUCs. Schedule changes must be approved by the PM. All schedule changes must be documented in the Project Notebook with date of the change, reason for the change, authority for the change, and scheduler making the change.

Definitions

Base Network Schedule – A project schedule template which includes predecessor and successor activities that may occur on various types of projects and is customized based upon the project scope to develop a project schedule.

Schedule Change – Use the reschedule feature to introduce new data to the schedule and affect schedule dates. Most schedule changes will fall in the routine schedule adjustment category.

Routine Schedule Adjustments: Changes to the schedule that may affect the dates and outcome.

- Adding/deleting activities based on scope or new project information
- Adjusting durations and labor units based on scope or new project information
- Adding constraints for desired results

PM's and WUC's must be notified of changes to a project schedule. If the change has a significant impact to the schedule, such as effecting multiple work centers or modification of the risk status, a Team meeting may be warranted.

Schedule Modification: Changes to the schedule that include modification of relationships between activities in the base network. The main intent of schedule modifications is to more closely match a project's realistic schedule as progress occurs and activities are completed.

Key points to consider regarding Schedule Modifications:

- Schedule Modifications support customizing schedule adaptations to the unique combination of an individual project characteristics and actual progress.
- Coordination and support are necessary from the PM's and WUC's.

Preferred Ready Date – The preferred ready date window for a project based on the improvement type.

Preferred Letting Date – The preferred letting date window for a project based on the improvement type.

As illustrated in Table 2-8, the Project Management strategy for increasing time between the Ready Date and Letting Date is based on the desire to create the ability to choose optimal letting dates, which may exist when an early Ready Date is successfully met. The Preferred Letting Date ranges begin in October based on the Federal Fiscal Year of October 1 through September 30. Projects successfully meeting an early Preferred Ready Date for the following Fiscal Year (e.g., January 15, 2049, Ready Date for a FY2050 Grading/Shoulder Widening project) may be let prior to October based on individual project needs related to project sequencing, duration of construction timeframes (1 or 2 years), coordination with other projects programmed in the Area and funding. Letting a project prior to October for the current programmed fiscal year will require a STIP revision with justification why the project should be advanced.

	Grading/Shoulder Widening [1]		Bridge Replacement [1]		Bridge Rehab	
	Preferred Ready Date	**Preferred Letting Date [2]**	**Preferred Ready Date**	**Preferred Letting Date [2]**	**Preferred Ready Date**	**Preferred Letting Date [3]**
FY2050	Jan 2049 - Sept 2049	Oct 2049 - Jan 2050	Feb 2049 - Nov 2049	Oct 2049 - March 2050	Apr 2049 - Nov 2049	Oct 2049 - March 2050
	Surfacing/Resurfacing		**ADA**		**Pavement Preservation**	
	Preferred Ready Date	**Preferred Letting Date [3]**	**Preferred Ready Date**	**Preferred Letting Date [3]**	**Preferred Ready Date**	**Preferred Letting Date [4]**
FY2050	March 2049 - Nov 2049	Oct 2049 - March 2050	Apr 2049 - Nov 2049	Oct 2049 - March 2050	Nov 2049 - Feb 2050	Jan 2050 - June 2050

Fiscal year and dates are shown for illustration purposes only.

[1] For projects that use the Short Grading Network, the preferred ready dates shown for Bridge Replacement can be used for the initial project schedule and determining project risk status.

[2] No later than April

[3] No later than May

[4] No later than May for Asphalt Concrete

Table 2-8 Preferred Ready and Letting Dates

Risk Status – an overall indication of an individual projects risk measured in green, yellow, or red.

Green (Low Risk) – Project falls within the preferred ready date window.

Yellow (At Risk) – The ready date is within 1 to 2 months of the preferred ready date window.

Red (Critical) – The ready date is more than 2 months behind the preferred ready date window. If a project is identified as red, the PM must coordinate resolution to the project schedule with the project team and scheduling personnel.

Project Risk Status

The project risk status is used to aid the PM and act as a communication tool for the delivery of projects. Project risk status can be changed through either a reschedule of a project or the PM or WUC self-identifying a change in risk status, which will then be verified through a reschedule. For example, if a PM identifies a that the release to Right-of-Way date will be missed, they can request a status change on a project. Depending on the planned finished and expected finish dates, the project may move to a yellow or red risk status.

EVALUATION POINTS / MILESTONES	THRESHOLD AT EACH REVIEW POINT TO DETERMINE STATUS LEVEL		
	GREEN (Low Risk)	YELLOW (At Risk)	RED (Critical)
Post Scope Based on Ready Date	X	X	X
Post Survey Based on Ready Date	X	X	X
Preliminary Design Based on Ready Date	X	X	X
Post TS&L Based on Ready Date	X	X	X
Public Involvement Based on Ready Date	X	X	X
Final Design Based on Ready Date	X	X	X
Release to ROW Based on Ready Date	X	X	X
Pre-ROW Negotiations Based on Ready Date	X	X	X
Post-ROW Negotiations Based on Ready Date	X	X	X
Complete Final Plans Based on Ready Date	X	X	X

Table 2-9 Project Risk Status

Change in Risk based on a Reschedule

Projects are rescheduled during predetermined project evaluation points based on the schedule. Through this effort, project ready dates can and will move along with other activities in the project schedule. If the project ready date falls out of the preferred ready date window, the risk status will change.

PROJECT CONTROL MANAGEMENT FRAMEWORK

Project controls are used to manage a project throughout the life cycle. Any change to a project after work has begun can have a significant impact in a variety of ways. Changes can affect outcomes, cause rework, effect schedules, impact STIP year as well as other results. One minor change at any stage can affect many other parts of the project. To limit impact, change needs to be managed and intentional. Multiple project change controls have been defined to ensure that when changes are needed or issues arise, processes are followed to ensure project schedules and outcomes are not impacted in unintended ways or without authority.

Change Control Processes/Policies

STIP Revisions - Refer to the STIP Revision Checklist/Submittal Form

Scope Amendments - Defines when a scope amendment is needed, what is the process to request, what work is involved, what rework may result and what the schedule impact will be. See Scope Amendment section previously discussed in this chapter.

Design Changes - Changes in design occur throughout the life of a project. Some example design changes may include revised grade line, work limits, geometrics, access, drainage, curb & gutter, retaining walls, and foundations. When design changes occur the PMs, WUCs and Resources must identify and communicate with work units affected, what level of notification/discussion is needed with the work units, what work is involved, what rework may result and what the schedule impact will be. Refer to Figure 2-2 for the process of considering when design changes are appropriate.

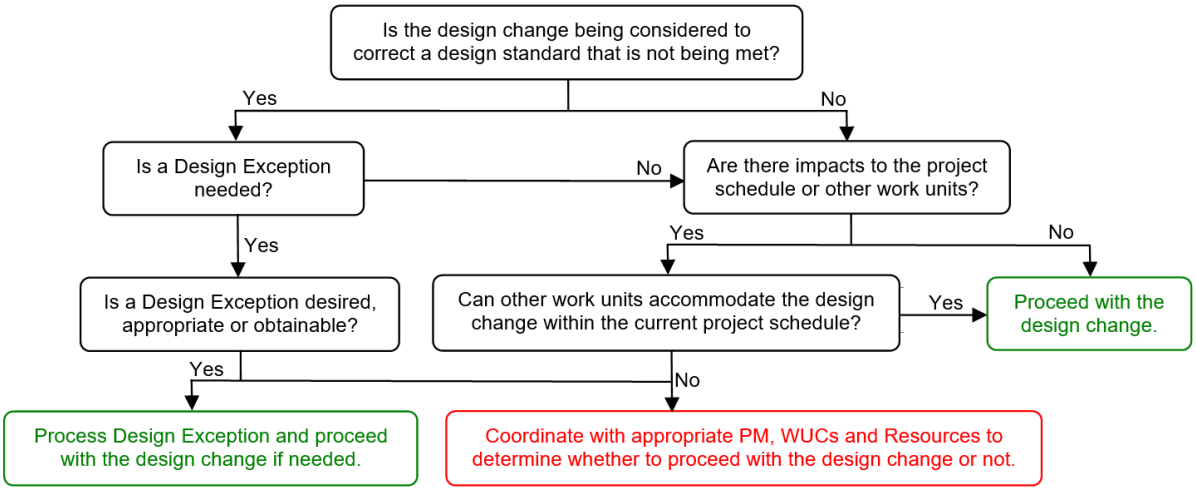


Figure 2-2 Design Change Process

Project Quality Control/Expectations - The quality of plans and specifications have a direct impact on project cost and constructability. Errors or ambiguities in the plans increase the probability of issues arising during construction, often resulting in costly changes and rework.

Variations in the wording of notes, changes in details, and even inconsistencies in line types, can cause uncertainty leading to problems in the bidding and construction of highway features. Information provided on the SDDOT website under Engineering/Design Servces is to be utilized in the production of plans.

The Department provides a multitude of manuals, files, specifications, and details for use to allow all stakeholders the ability to produce clear, consistent plans for the contracting community. It is expected that all plans being produced by, or for, the Department will be universally consistent in format and content as outlined in this manual. The information provided by the Department is consistently updated to incorporate changes in policy, Federal or State requirements, and methodologies, and plans must utilize the most current version available.

Although all plans require some unique details, specifications, or notes, the format and content included in the plans must be consistent with other details and notes provided by the Department. The plans must include adequate detail to allow the Contractor/Supplier to bid and construct the item of work to be accomplished. Certain criteria must be met for plans to be accepted by the SDDOT. These criteria include:

- All provisions, specifications, standard plates, details, bid items, and notes must be the current versions available from SDDOT
- Plans must be provided in pdf format
- The pdf document must be flattened before submittal
- All text within the file(s) must be searchable

Construction plans undergo a rigorous review process prior to release to the contracting community. This process begins during the scoping phase and continues at different stages through the release of plans for letting. The plans are reviewed by various office staff for conformance to design criteria, and plans format and content. After final plans are complete, a Department review utilizing the Bluebeam software is accomplished, which allows anyone with internet access the ability to review the plans. All comments from this review must be incorporated or rejected (with notice being provided to the person commenting) without exception. Please refer to the Bluebeam Revu and Vu Manuals regarding this process.

After Department review and incorporation of applicable review comments, the plans will be reviewed by the Quality Management Engineer for any further concerns prior to the release of plans for letting to bids.

There are a number of plans that are not subject to full compliance with the format and content used by the Department, for example City utility projects. Figure 2-3 is provided to help plan preparers determine which criteria must be followed in the production of plans.

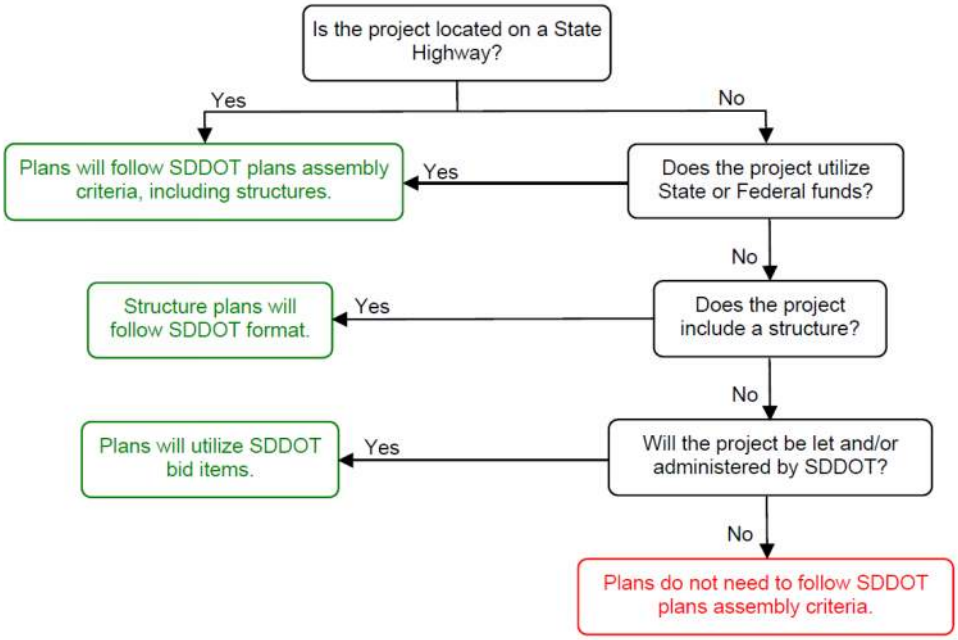


Figure 2-3 Quality Control for Plans Preparation

Primavera Schedule Changes - Define when project schedules will be reviewed and may be modified and identify the authority to authorize schedule changes. See Project Schedule Changes section previously discussed in this chapter.

Project Management Changes - The staff or group recommending a process or project change has the initial responsibility to clearly define the issue and the background of the topic. Many positions, programs, or divisions may hear of “complaints” or “suggestions” on a regular basis. No one person has the time to provide adequate consideration to every “complaint” or “suggestion” shared, even if the complaint or suggestions are actually beneficial to a position, program or division.

Transportation projects are identified and programmed based on safety, condition or capacity needs. Project Management changes are identified & committed to based on efficiency gains in dollars, time or human effort.

SDDOT considers a Project Management change as normal daily business in our constant effort to do more work, better than yesterday, faster and more efficiently. This is out of necessity as the list of needs is always increasing and projects continue to get larger and more complex.

Steps for Project Management Change Model

For the purpose of the Project Management Change Model as illustrated in Figure 2-4, the following roles and responsibilities may be considered:

- The **Sponsor** is the person or group recommending a Project Management change.
- The **Executive Sponsor** is the person who has ultimate authority and responsibility for the project or program for which the change is being recommended.
- **Change Coordinator** is the person responsible for the project or program for which the change is recommended.
- **Stakeholder Committee** is the group of people who individually either have insight into the recommended change or involvement in the Project Management process or policy for which change is being sought. Similar in concept to a scope team, in that ALL positions or offices impacted by the recommended change need to be involved.

Figure 2-4 Project Management Change Model

Communication, coordination and collaboration are required components of successful Project Management. Project Management process changes shall include the following phases and steps as described.

Identification Phase (Step 1) - The Sponsor has an idea or finds a need for changing a Project Management process. The following criteria & questions must first be reviewed and answered by the Sponsor.

- Concisely define the recommended Project Management change by providing a detailed description of what the key issue is perceived to be.
- Review and define what must be changed; is it a policy, a guideline, or a general practice?
- Define what is to be gained by the recommended change; is it financial, time or human effort?
- Is the Sponsor's Management on board with recommended change?

Another way to look at the Identification Phase is to think of it as "Creating the Vision", meaning this is the opportunity for the Sponsor to build a solid case for change by clearly defining the reasons why the change should be made.

Evaluation Phase (Steps 2-4) - In this phase, all necessary roles and responsibilites will be involved in the process to determine the validity and benefit of the proposed Project Management change. This could be a very iterative process or it could be very quick, depending on the complexity of the process change.

Step 2. Review potential efficiency gain in dollars, time or human effort with the identified Executive Sponsor and Process Change Coordinator.
Step 3. If needed, based on magnitude of Project Management change, work to get a Stakeholder Committee established.
Step 4. Use communication, coordination and collaboration to more intensly review potential efficiency gain in dollars, time or human effort and work on change implementation strategies. This may be an iterative process.

Committment Phase (Step 5) - If the Sponsor is successful in getting through the Identification and Evaluation Phases with support from the other process participants, commitment is obtained.

Execution Phase (Step 6) - In the Execution Phase, the Change Coordinator will take the steps necessary to implement the Project Management change. The Change Coordinator may need to utilize the knowledge, skills and abilities of the Stakeholder Committee to implement the Project Management change.

Review Phase (Step 7) - For the Review Phase of the Project Management change, the Sponsor, Executive Sponsor and Change Coordinator should collaborate and identify efficiencies gained with the implemented Project Management change. Documentation and communication of results may vary based on the magnitude of the Project Management change, but this evaluation should still be a key concept in the process. The Executive Sponsor and Change Coordinator reviews change successes and lessons learned, possibly to be reported to the Stakeholder Committee and others as needed.

Example Project Management Change

An example of a minor Project Management change would be the addition, elimination, or modification of an activity or relationship between activities in Primavera. Major Project Management changes may require more resource and time commitment due to the amount of coordination required and possible impacts to multiple staff, programs or divisions. In the example of changing an activity within primavera, the following steps would be followed:

Step 5. Sponsor (any staff) has an idea or finds a need for Project Management process change. Sponsor will visit with Executive Sponsor (i.e. supervisor and/or program manger) about the suggested Project Management change.
Step 6. Sponsor and Executive Sponsor works with the Change Coordinator (i.e. Project Delivery Engineer and/or Project Schedule Coordinator) to determine if this Project Management process change may have value.
Step 7. For a major Project Management change, when other staff, programs, or divisions might be affected by the suggested Project Management change, establish a Stakeholder Committee for additional input. This example wouldn't warrant such efforts.
Step 8. Most likely, minor coordination and communication with face to face meetings, phone calls or emails to affected staff will suffice to evaluate the gains in dollars, time or human effort that may result from the Project Management change.
Step 9. Collectively, make the determination that the change is a positive impact and commit to the change.
Step 10. The Change Coordinator executes the change and informs all affected staff that change has taken place. When necessary, this step includes proper documentation to describe the change.
Step 11. Monitor and measure the value of the Project Management change through the next project schedule review point and/or project control meeting.

Tools in place to support the change control processes include:

- Team involvement on developing Initial Schedule
  - All work unit involvement to develop the best possible schedule based on information available.
- Institute a Project Hand-Off meeting between the scope process and prior to design beginning for 3R and 4R projects.
  - PM will determine need and timing of hand-off meeting with TPE and other work units.
- Scheduled Review Points
  - Defined points in a schedule where the actual progress is evaluated and scheduled updated.
- At Risk Status Indicator
  - Flag assigned to each project and updated at scheduled review points to indicate if the project is on schedule or amount of time off schedule. Risk status is based on anticipated ready date alignment with preferred letting dates.
- Project Control Meetings
  - Analyzing needed actions and options on At Risk projects. Also, making decisions on saving or deferring a project.
- Schedule Delay Indicators
  - Identifying the root cause of significant schedule delays or STIP year deferrals.

Project Change Control Process

Project control process will be used to review any change in deliverables during the life of a pre-construction project. Each work unit has a set of deliverables toward final accomplishment of the project. Deliverables are the completed project related work that is passed from one unit to another at a designated point in the process. At certain points of the project's life cycle, the process may change slightly due to the work units impacted by a change. PMs and Program Managers may determine when it is appropriate for a control process step to be bypassed or adjusted.

Office/Program internal project control.

1. Resource identifies:
   a. Issue or concern with a project aspect
   b. Idea for change or improvement to the project
2. Resource discusses with supervisor/lead worker before veering from project plans or standard practice.
3. If minor impact to project plans, schedule, etc. does not affect other work centers or project outcome, WUC makes decision.
4. If impacts to project plans, schedule, etc. affects other work centers, causes rework or has potential to affect project outcome, WUC involves next level supervisor.
5. At this point the issue is referred to the Division/Department Project Control Process.

Division/Department Project Control Process:

1. Upon identification of an issue that will affect the project or project schedule, notification is made to the TPE, WUC, PM or Program Manager of the issue. Notification must include what the issue is, why the change is being recommended and other viable options to avoid or minimize the change.
2. The TPE, WUC, or PM coordinates with other affected work units. Provide the same information as above. Discussion with all involved parties to consider each work unit's impact and the overall project impact.
3. Collective decision on approving the change weighing the significance of the change, the necessity of the change (need to have verses nice to have), impact to the project schedule and STIP year, impact to resources of affected work units.
4. For high profile projects (4R), changes that move a construction year include notification of Division Directors and Project Development Program Manager.
5. STIP year changes are approved by the Project Development Program Manager, Division Directors, Secretary of Transportation, and Transportation Commission.
6. The project schedule will reflect the fiscal year change after the STIP Revision is approved and finalized.

APPENDIX A

Guidance on Federal-aid Funding Eligibility for Preservation and Maintenance

The purpose of this guidance to provide clarification to existing rules, regulations, and policies in determining Federal-aid eligibility for preservation and maintenance projects in South Dakota.

Preservation consists of work that is planned and performed to improve or sustain the condition of the transportation facility in a state of good repair. Preservation activities generally do not add capacity or structural value but do restore the overall condition of the transportation facility. Preservation is now included in the definition for construction in 23 U.S.C. 101 and thus eligible and encouraged under the National Highway Performance Program (NHPP), the Surface Transportation Block Grant Program (STBG) and the Bridge Formula Program (BFP).

Maintenance describes work that is performed to maintain the condition of the transportation system or to respond to specific conditions or events that restore the highway system to a functional state of operation. Maintenance is a critical component to the SDDOT asset management plan and is comprised of both routine and preventive maintenance. Routine maintenance encompasses work that is performed in reaction to an event, season, or overall deterioration of the transportation asset. This work requires regular reoccurring attention. Routine maintenance is not eligible for federal-aid funding. Preventive maintenance is a proactive approach and encompasses work that has proven to be a cost-effective means of extending the useful life of highways, bridges, and essential highway appurtenances. Preventive maintenance is eligible for federal-aid funding if the work is on a "Federal-aid highway." (23 U.S.C. § 116 (e)). A Federal-aid highway is defined as "a public highway eligible for assistance under this chapter other than a highway functionally classified as a local road or rural minor collector." (23 U.S.C. § 101 (a)(6)).

The key to making eligibility determinations is early communication with the FHWA Division Office. The Project Development Office will be responsible for contacting FHWA regarding any projects where eligibility may be in question.

I. Preservation and Maintenance for Pavements

A. Eligible Activities

Asphalt Concrete Pavement
Route and/or Seal Cracks
Crack-Leveling
Rut Filling
Chip Seals
Thin Asphalt Concrete Resurfacing
Micro-Surfacing
Macro-Surfacing
Slurry Seal

Portland Cement Concrete Pavement
Joint/spall repair, Partial and Full-Depth Repairs
Cross Stitching
Dowel Bar Retrofit
Re-sealing Joints and/or Random Cracks
Undersealing and/or Pavement Jacking
Diamond Grinding

Miscellaneous
Pavement Drainage System
Prime and Seal Gravel Surfacing

B. Non-Eligible Activities

Pothole repair or patching (temporary repair with cold or hot mix)
Isolated concrete/asphalt patching (fixing isolated damaged areas or repairs, smoothing out a bump(s) for ride)
Joint replacement at isolated locations
Full width and depth slab replacement at isolated locations
Isolated asphalt overlays on PCCP defined as lengths less than 500 feet as per SDDOT Pavement Management System
Blading gravel surfacing
Stockpiling of gravel surfacing material
Isolated gravel surfacing placement
Blading shoulders to provide proper surface drainage

II. Preservation and Maintenance for Bridges

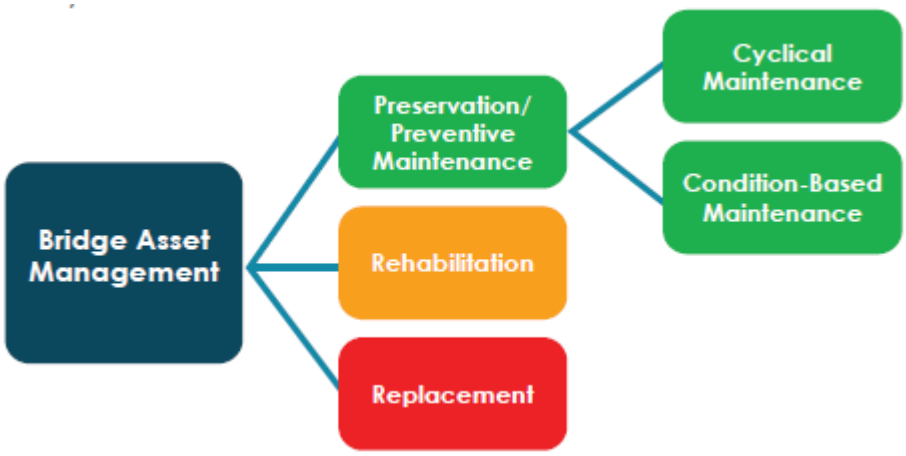
This guidance defines bridge preservation terms, identifies commonly practiced bridge preservation activities and what activities are Federal-aid eligible.

Bridge Preservation - Bridge preservation is defined as actions or strategies that prevent, delay, or reduce deterioration of bridges or bridge elements; restore the function of existing bridges; keep bridges in good or fair condition; and extend their service life. Preservation actions may be cyclic, or condition driven.

Preventive Maintenance - Preventive maintenance (PM) is a cost-effective means of extending the service life of highway bridges.

Cyclical Maintenance Activities - Cyclical maintenance activities are performed on pre-determined intervals that aim to preserve and delay deterioration of bridge elements or component conditions.

Condition-Based Maintenance Activities - Condition-based maintenance activities are performed on bridge components or elements in response to known defects. Condition based maintenance improves the condition of that portion of the element but may or may not result in an increase in the component condition rating.



Bridge Action Categories

Refer to Tables 2A-1 and 2A-2 for common actions based on bridge condition ratings.

Federal-aid Eligibility Summary

Action	Activities	Eligible for Federal aid
Maintenance	Routine Maintenance	No
Preservation/Preventive Maintenance	Cyclical Maintenance	Yes
	Condition-Based Maintenance	Yes
Rehabilitation	-	Yes
Replacement	-	Yes

Eligible bridge preservation activities are based on General Condition Ratings (GCR) or Element Condition States (ECS).

GCR between 7-9 cyclic maintenance activities would typically be the common action and GCR 5-6 condition-based maintenance activities would typically be the common action. SDDOT will need to coordinate with the FHWA Division Office for a Federal-aid eligibility determination for condition-based maintenance activity(s) to be used on a bridge element(s) with a GCR 4. Preservation activities will not be Federal-aid eligible for bridges with a GCR less than 4.

ECS-1 will typically be cyclic maintenance activities. ECS-2 could be either cyclic or condition-based maintenance activities. An ECS-3 would be condition based maintenance activities or rehabilitation when the quantity of poor exceeds a limit that condition-based maintenance is not cost effective. SDDOT will need to coordinate with the FHWA Division Office for a Federal-aid eligibility determination for condition-based maintenance activity(s) to be used on a bridge element(s) with an ECS-3.

SDDOT will need to demonstrate to the FHWA Division Office that the selected condition-based maintenance activity(s) is/are cost effective and would raise the GCR/ECS of the bridge component(s) to a minimum of a fair condition and extend the service life of a bridge.

A. Eligible Activities

Cyclical Maintenance Activities

Cyclical Maintenance Activity	Bridge Component
Clean/Wash Bridge	Deck/Superstructure/Substructure
Clean and Flush Drains	Deck
Clean Joints	Deck
Deck/Parapet/Rail Sealing and Crack Sealing	Deck
Seal Concrete	Superstructure/Substructure

Condition-Based Maintenance Activities

Condition-Based Maintenance Activity	Bridge Component
Drains, Repair/Replace	Deck
Joint Seal Replacement	Deck
Joint Repair/Replace/Elimination	Deck
Electrochemical Extraction (ECE)/Cathodic Protection (CP)	Deck
Concrete Deck Repair in Conjunction with Overlays, CP Systems or ECE Treatment	Deck
Deck Overlays (thin polymer epoxy, asphalt with waterproof membrane, rigid overlays)	Deck
Bridge Railing Repair	Deck
Repair/Replace Approach Slabs	Approach
Roadway Grade Profile Correction to Minimize Impact Loading	Approach
Seal/Patch/Repair Superstructure Concrete	Superstructure
Protective Coat Concrete/Steel Elements	Superstructure
Spot/Zone/Full Painting Steel Elements	Superstructure
Steel Member Repair/Heat Straightening	Superstructure
Fatigue Crack Mitigation (pin-and-hanger replacement, retrofit fracture critical members)	Superstructure
Retrofit of Fatigue Prone Details	Superstructure
Bearing Restoration (cleaning, lubrication, resetting, replacement)	Superstructure
Movable Bridge Machinery Cleaning/Lubrication/Repair	Superstructure
Patch/Repair Substructure Concrete	Substructure/Culvert
Protective Coat/Concrete/Steel Substructure	Substructure/Culvert
ECE/CP	Substructure/Culvert
Spot/Zone/Full Painting Steel Substructure	Substructure
Pile Preservation (jackets/wraps/CP)	Substructure
Retaining Wall Repair for Bridge	Substructure
Mechanically Stabilized Earth Wall Repair for Bridge	Substructure
Berm Slope Repair	Berm Slope
Channel Cleaning / Debris Removal	Channel
Scour Countermeasure (installation/repair)	Channel

Other
Tunnel Repair

B. Non-Eligible Activities

Routine Maintenance Activities

Deck Patching (temporary)
Structural Repair (temporary)
Asphalt Patch with No Membrane on Concrete Deck
Accident Damage to Bridge and Its Appurtenances
Storm Damage

Snow Removal/Application of Salt/Deicing Chemicals
Graffiti Removal
Hazardous Material Removal
Trash, Litter, and Dead Animal Removal

III. Preservation and Maintenance for Other Highway Features

A. Eligible Activities

Installation or Upgrading of Substandard Guardrail or End-Treatments
Culvert Lining Installation/Repair
Remove and Reset RCP (reset sections must be tied)
Installation/Replacement of Traffic Signs and Delineators
Removal/Shielding of Roadside Obstacles.
Mitigation of Edge Drop-Offs
Addition of Paved or Stabilization of Unpaved Shoulders
Installation of rumble strips
Installation/Upgrade Lighting to Current Standards
Original Installation of Pavement Marking
Region Wide Installation and/or Repair of Durable Pavement Marking
Slope Flattening of In-slopes and/or Approaches
Installation and/or Replacement of Continuous Segments of Interstate Fence
Interstate Rest Areas/Port of Entries

a. Construct/Reconstruct Parking Lots
b. Chip Sealing/Sealing of Parking Lots
c. Joint Repair of Parking Lots
d. Installation/Upgrade of Luminaries to Current Standards
e. Installation/Replace shelters
f. Construct Waste Treatment Pond
g. Installation/Upgrade Security Systems to Current Standards
h. Replacement of Plumbing/Heating/Cooling/Electrical (etc.) Systems Requires prior FHWA Approval

B. Non-Eligible Activities

Pipe Cleanout
Maintenance of Pavement Markings (i.e., repainting of water-borne based pavement markings)
Isolated Repair of Durable Pavement Markings
Routine Maintenance on Signal/Lighting Fixtures (i.e., changing light bulbs, lens, lens seals, lubricating cable lowering system)
Purchase and Installation of Traffic Signs by State or Local Forces
Routine Repair of Interstate Fence to Fix a Broken Wire or Reattach to Posts
Replacement of Isolated Posts to Maintain Control of Access on Interstate Fence
Any Fencing on Non-Interstate Facilities

Repair Plumbing, Electrical, Heating, Cooling, or any Structural Element of the Interstate Rest Area Facility
Cleaning of Interstate Rest Area Waste Treatment Pond
Mowing of Interstate Rest Area

Reference:

Guidance on Highway Preservation and Maintenance (FHWA Memo 2/25/2016)
https://www.fhwa.dot.gov/preservation/memos/160225.cfm

Additional information: For additional information on Federal-Aid highway programs and projects, please visit the following:

A Guide to Federal-Aid Programs and Projects:
http://www.fhwa.dot.gov/federalaid/projects.cfm

Eligibility of Replacement Parts for Safety-related Hardware (FHWA Memo 6/10/2008):
https://www.fhwa.dot.gov/federalaid/080610.cfm

Additional Guidance on 23 CFR 650A (Formerly Non-Regulatory Supplement - Storm Drainage Responsibility):
http://www.fhwa.dot.gov/legsregs/directives/fapg/0650asu1.htm

Bridge Preservation Guide, Maintaining a Resilient Infrastructure to Preserve Mobility (Spring 2018)
https://www.fhwa.dot.gov/bridge/preservation/guide/guide.pdf

Code	Description	Common Actions
9	EXCELLENT CONDITION	Preservation/Cyclic Maintenance
8	VERY GOOD CONDITION—No problems noted.	
7	GOOD CONDITION—Some minor problems.	
6	SATISFACTORY CONDITION—Structural elements show some minor deterioration.	Preservation/ Condition-Based Maintenance
5	FAIR CONDITION—All primary structural elements are sound but may have some minor section loss, cracking, spalling, or scour.	
4	POOR CONDITION—Advanced section loss, deterioration, spalling, or scour.	Rehabilitation or Replacement
3	SERIOUS CONDITION—Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
2	CRITICAL CONDITION—Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present, or scour may have removed substructure support. Unless closely monitored, the bridge may have to be closed until corrective action is taken.	
1	IMMINENT FAILURE CONDITION—Major deterioration or section loss present in critical structural components, or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put it back in light service.	
0	FAILED CONDITION—Out of service. Bridge is beyond corrective action.	

Table 2A-1 Common Actions Based on National Bridge Inventory General Condition Ratings

Condition State	Description	Common Actions[10]
1	Varies depending on element—Good	Preservation/Cyclic Maintenance
2	Varies depending on element—Fair	Cyclic Maintenance or Condition-Based Maintenance when cost effective.
3	Varies depending on element—Poor	Condition-Based Maintenance, or Rehabilitation—when quantity of poor exceeds a limit that condition-based maintenance is not cost effective, or Replacement—when rehabilitation is not cost effective.
4	Varies depending on element—Severe	Rehabilitation or Replacement

Table 2A-2 Common Actions Based on Bridge Element Condition States